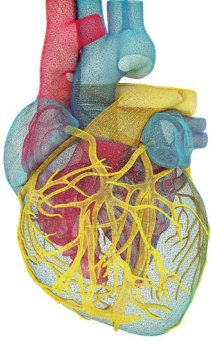


# BÖLÜM 59



## Diyabetik Hastada Kardiyovasküler Cerrahi

Oğuz ARSLANTÜRK<sup>1</sup>

### GİRİŞ

Diyabetik hastalarda özellikle kardiyovasküler hastalıklar önde gelen ölüm nedenlerinden biri olmaya devam etmektedir. Hiperglisemi, insülin direnci, hipertansiyon, obesite ve dislipidemi gibi faktörler ateroskleroz ve kardiyovasküler hastalık gelişiminde rol oynar (1). Dünya Sağlık Örgütü dünya çapında 180 milyondan fazla insanın diyabetik olduğunu ve bu sayının 2030 yılına kadar iki katından fazla olacağını tahmin etmektedir (2). Diabetes mellitus (DM) kardiyovasküler hastalık geliştirme açısından risk faktörü olmakla birlikte cerrahi sonrası komplikasyonlar açısından önemli bir etkindir (3). Cerrahi operasyon geçirmiş diyabetik hastalarda yara iyileşmesinde zorluk ve artmış enfeksiyon riskinin sebebi; hipergliseminin lökosit fonksiyonlarını bozması, fagositozu, kemataksiyi, bakteri yıkımını, neovaskülarizasyonu ve kollajen sentezini sınırlandırmasıdır. Sonuç olarak cerrahi bölgede yeni ve sağlıklı doku oluşumu sınırlandırılmış olur (4-6). Trick ve arkadaşlarının yapmış olduğu çalışmada; preoperatif glisemik kontrolü zayıf olan diyabet hastalarında yara yeri enfeksiyonun anlamlı derecede yüksek olduğu bildirilmiştir (7). Amerikan Toraks Cer-

rahları Ulusal Veri Tabanı sonuçları; diyabetik hastaların kardiyak cerrahi prosedürlerden herhangi birini takiben 30 gün içinde ölüm olasılıklarının daha yüksek olduğunu, inme ve uzun süreli postoperatif hastanede kalış süresine sahip olma olasılıklarının daha yüksek olduğunu göstermiştir (8). Bununla birlikte kalp cerrahisi geçiren diyabetik hastalarda sürekli insülin infüzyonu ile agresif glukoz takibinin önemi bu yüzyılın başında yapılan çalışmalarla belirtilmiştir (9,10). Diyabetik hastalarda kardiyovasküler cerrahi; diyabetik hastalarda kalp cerrahisi ve diyabetik hastalarda vasküler cerrahi olmak üzere iki başlık halinde inceledik.

### DIYABETİK HASTALARDA KALP CERRAHİSİ

Kalp cerrahisi hastalarının %30'u kadarında teşhis edilmemiş diyabet vardır (11). Kalp cerrahisi hastalarında yapılan birçok gözlemsel ve prospektif randomize çalışma, hiperglisemi ile kötü klinik sonuç arasında güçlü bir ilişki olduğunu desteklemektedir. Kalp cerrahisinde hipergliseminin kontrolü perioperatif dönemde, cerrahi

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## KAYNAKLAR

1. Joseph JJ, Deedwania P, Acharya T, et al. Comprehensive Management of Cardiovascular Risk Factors for Adults With Type 2 Diabetes: A Scientific Statement From the American Heart Association. *Circulation* 2022; 145: e722-e759. DOI: doi:10.1161/CIR.0000000000001040.
2. Libby P and Plutzky J. Diabetic macrovascular disease: the glucose paradox? : *Am Heart Assoc*, 2002, p. 2760-2763.
3. Hoogwerf BJ, Waness A, Cressman M, et al. Effects of aggressive cholesterol lowering and low-dose anticoagulation on clinical and angiographic outcomes in patients with diabetes: the Post Coronary Artery Bypass Graft Trial. *Diabetes* 1999; 48: 1289-1294.
4. Duggan EW, Klopman MA, Berry AJ, et al. The Emory University Perioperative Algorithm for the Management of Hyperglycemia and Diabetes in Non-cardiac Surgery Patients. *Current Diabetes Reports* 2016; 16: 34. DOI: 10.1007/s11892-016-0720-z.
5. Jakelić J, Kokić S, Hozo I, et al. Nonspecific immunity in diabetes: hyperglycemia decreases phagocytic activity of leukocytes in diabetic patients. *Medicinski arhiv* 1995; 49: 9-12.
6. Turina M, Fry DE and Polk Jr HC. Acute hyperglycemia and the innate immune system: clinical, cellular, and molecular aspects. *Critical care medicine* 2005; 33: 1624-1633.
7. Trick WE, Scheckler WE, Tokars JI, et al. Modifiable risk factors associated with deep sternal site infection after coronary artery bypass grafting. *The Journal of thoracic and cardiovascular surgery* 2000; 119: 108-114.
8. Brown JR, Edwards FH, O'Connor GT, et al. The Diabetic Disadvantage: Historical Outcomes Measures in Diabetic Patients Undergoing Cardiac Surgery—The Pre-Intravenous Insulin Era. *Seminars in Thoracic and Cardiovascular Surgery* 2006; 18: 281-288. DOI: <https://doi.org/10.1053/j.semtcvs.2006.04.004>.
9. Furnary AP, Gao G, Grunkemeier GL, et al. Continuous insulin infusion reduces mortality in patients with diabetes undergoing coronary artery bypass grafting. *The Journal of thoracic and cardiovascular surgery* 2003; 125: 1007-1021.
10. Furnary AP, Zerr KJ, Grunkemeier GL, et al. Continuous intravenous insulin infusion reduces the incidence of deep sternal wound infection in diabetic patients after cardiac surgical procedures. *The Annals of thoracic surgery* 1999; 67: 352-360.
11. Navaratnarajah M, Rea R, Evans R, et al. Effect of glycaemic control on complications following cardiac surgery: literature review. *Journal of Cardiothoracic Surgery* 2018; 13: 10. DOI: 10.1186/s13019-018-0700-2.
12. Lazar HL, McDonnell M, Chipkin SR, et al. The Society of Thoracic Surgeons practice guideline series: Blood glucose management during adult cardiac surgery. *Ann Thorac Surg* 2009; 87: 663-669. 2009/01/24. DOI: 10.1016/j.athoracsur.2008.11.011.
13. Bucerius J, Gummert JF, Walther T, et al. Impact of Diabetes Mellitus on Cardiac Surgery Outcome. *Thorac Cardiovasc Surg* 2003; 51: 11-16.
14. Ponikowski P, Voors AA, Anker SD, et al. 2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure: The Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC) Developed with the special contribution of the Heart Failure Association (HFA) of the ESC. *Eur Heart J* 2016; 37: 2129-2200. 2016/05/22. DOI: 10.1093/eurheartj/ehw128.
15. Yancy CW, Jessup M, Bozkurt B, et al. 2013 ACCF/AHA Guideline for the Management of Heart Failure. *Journal of the American College of Cardiology* 2013; 62: e147-e239. DOI: doi:10.1016/j.jacc.2013.05.019.
16. Shamszad P, Rossano JW, Marino BS, et al. Obesity and Diabetes Mellitus Adversely Affect Outcomes after Cardiac Surgery in Children's Hospitals. *Congenital Heart Disease* 2016; 11: 409-414. DOI: <https://doi.org/10.1111/chd.12325>.
17. Galindo RJ, Fayfman M and Umpierrez GE. Perioperative Management of Hyperglycemia and Diabetes in Cardiac Surgery Patients. *Endocrinol Metab Clin North Am* 2018; 47: 203-222. 2018/02/07. DOI: 10.1016/j.ecl.2017.10.005.
18. Leal J, Gray AM and Clarke PM. Development of life-expectancy tables for people with type 2 diabetes. *European heart journal* 2009; 30: 834-839.
19. Stevens RJ, Kothari V, Adler AI, et al. The UKPDS risk engine: a model for the risk of coronary heart disease in Type II diabetes (UKPDS 56). *Clinical science* 2001; 101: 671-679.
20. Franco OH, Steyerberg EW, Hu FB, et al. Associations of diabetes mellitus with total life expectancy and life expectancy with and without cardiovascular disease. *Archives of internal medicine* 2007; 167: 1145-1151.
21. Berry C, Tardif J-C and Bourassa MG. Coronary heart disease in patients with diabetes: part I: recent advances in prevention and noninvasive management. *Journal of the American College of Cardiology* 2007; 49: 631-642.
22. Stone K and Chiquette E. Chitton FL [. Diabetic endovascular disease: role of coronary artery revascularization. *Am J Cardiol* 2007; 99: 105B-101.
23. Koshizaka M, Lopes RD, Reyes EM, et al. Long-term clinical and angiographic outcomes in patients with diabetes undergoing coronary artery bypass graft surgery: Results from the PROject of Ex-vivo Vein graft ENgineering via Transfection IV Trial. *American Heart Journal* 2015; 169: 175-184. DOI: <https://doi.org/10.1016/j.ahj.2014.10.013>.
24. Van den Berghe G, Wouters P, Weekers F, et al. Intensive insulin therapy in critically ill patients. *New England journal of medicine* 2001; 345: 1359-1367.
25. Magee MJ, Dewey TM, Acuff T, et al. Influence of diabetes on mortality and morbidity: off-pump coronary artery bypass grafting versus coronary artery bypass grafting with cardiopulmonary bypass. *The Annals of Thoracic Surgery* 2001; 72: 776-781. DOI: [https://doi.org/10.1016/S0003-4975\(01\)02840-5](https://doi.org/10.1016/S0003-4975(01)02840-5).
26. Huang K-C, Wu IH, Chou N-K, et al. Late outcomes of off-pump versus on-pump coronary bypass in patients with diabetes: A nationwide study from Taiwan. *The*

- Journal of Thoracic and Cardiovascular Surgery* 2019; 157: 960-969.e962. DOI: <https://doi.org/10.1016/j.jtcvs.2018.08.084>.
27. Farkouh ME, Domanski M, Sleeper LA, et al. Strategies for Multivessel Revascularization in Patients with Diabetes. *New England Journal of Medicine* 2012; 367: 2375-2384. DOI: 10.1056/NEJMoa1211585.
  28. Investigators BARI. Comparison of coronary bypass surgery with angioplasty in patients with multivessel disease. *New England Journal of Medicine* 1996; 335: 217-225.
  29. Influence of diabetes on 5-year mortality and morbidity in a randomized trial comparing CABG and PTCA in patients with multivessel disease: the Bypass Angioplasty Revascularization Investigation (BARI). *Circulation* 1997; 96: 1761-1769. 1997/10/10. DOI: 10.1161/01.cir.96.6.1761.
  30. Leavitt BJ, Sheppard L, Maloney C, et al. Effect of diabetes and associated conditions on long-term survival after coronary artery bypass graft surgery. *Circulation* 2004; 110: II-41-II-44.
  31. Singh SK, Desai ND, Petroff SD, et al. The impact of diabetic status on coronary artery bypass graft patency: insights from the radial artery patency study. *Circulation* 2008; 118: S222-S225.
  32. Kazui T, Lick SD, Hsu C-H, et al. Short-Term Risk of Bilateral Internal Mammary Artery Grafting in Diabetic Patients. *Seminars in Thoracic and Cardiovascular Surgery* 2021; 33: 382-392. DOI: <https://doi.org/10.1053/j.semtcvs.2020.09.002>.
  33. Peterson MD, Borger MA, Rao V, et al. Skeletonization of bilateral internal thoracic artery grafts lowers the risk of sternal infection in patients with diabetes. *J Thorac Cardiovasc Surg* 2003; 126: 1314-1319. 2003/12/11. DOI: 10.1016/s0022-5223(03)00808-0.
  34. Serruys PW, Ong ATL, Herwerden LAV, et al. Five-Year Outcomes After Coronary Stenting Versus Bypass Surgery for the Treatment of Multivessel Disease. *Journal of the American College of Cardiology* 2005; 46: 575-581. DOI: doi:10.1016/j.jacc.2004.12.082.
  35. Booth J, Clayton T, Pepper J, et al. Randomized, controlled trial of coronary artery bypass surgery versus percutaneous coronary intervention in patients with multivessel coronary artery disease: six-year follow-up from the Stent or Surgery Trial (SoS). *Circulation* 2008; 118: 381-388.
  36. Kapur A, Hall RJ, Malik IS, et al. Randomized comparison of percutaneous coronary intervention with coronary artery bypass grafting in diabetic patients: 1-year results of the CARDia (Coronary Artery Revascularization in Diabetes) trial. *Journal of the American College of Cardiology* 2010; 55: 432-440.
  37. Kappetein AP, Head SJ, Morice MC, et al. Treatment of complex coronary artery disease in patients with diabetes: 5-year results comparing outcomes of bypass surgery and percutaneous coronary intervention in the SYNTAX trial. *Eur J Cardiothorac Surg* 2013; 43: 1006-1013. 2013/02/16. DOI: 10.1093/ejcts/ezt017.
  38. Lawton JS, Tamis-Holland JE, Bangalore S, et al. 2021 ACC/AHA/SCAI Guideline for Coronary Artery Revascularization. *Journal of the American College of Cardiology* 2022; 79: e21-e129. DOI: doi:10.1016/j.jacc.2021.09.006.
  39. Anderson RE, Brismar K, Barr G, et al. Effects of cardiopulmonary bypass on glucose homeostasis after coronary artery bypass surgery. *European journal of cardio-thoracic surgery* 2005; 28: 425-430.
  40. Stevens LM, Carrier M, Perrault LP, et al. Influence of diabetes and bilateral internal thoracic artery grafts on long-term outcome for multivessel coronary artery bypass grafting. *European Journal of Cardio-Thoracic Surgery* 2005; 27: 281-288. DOI: 10.1016/j.ejcts.2004.10.048.
  41. Nyström T, Holzmann MJ, Eliasson B, et al. Glycemic Control in Type 1 Diabetes and Long-Term Risk of Cardiovascular Events or Death After Coronary Artery Bypass Grafting. *Journal of the American College of Cardiology* 2015; 66: 535-543. DOI: <https://doi.org/10.1016/j.jacc.2015.05.054>.
  42. Holzmann MJ, Rathsman B, Eliasson B, et al. Long-Term Prognosis in Patients With Type 1 and 2 Diabetes Mellitus After Coronary Artery Bypass Grafting. *Journal of the American College of Cardiology* 2015; 65: 1644-1652. DOI: <https://doi.org/10.1016/j.jacc.2015.02.052>.
  43. Nyström T, Sartipy U, Franzén S, et al. PCI Versus CABG in Patients With Type 1 Diabetes and Multivessel Disease. *Journal of the American College of Cardiology* 2017; 70: 1441-1451. DOI: doi:10.1016/j.jacc.2017.07.744.
  44. Hansen L, Winkel S, Kuhr J, et al. Factors influencing survival and postoperative quality of life after mitral valve reconstruction. *European journal of cardio-thoracic surgery* 2010; 37: 635-644.
  45. Bechtel JM, Detter C, Fischlein T, et al. Cardiac surgery in patients on dialysis: decreased 30-day mortality, unchanged overall survival. *The Annals of thoracic surgery* 2008; 85: 147-153.
  46. Birkmeyer NJ, Marrin CA, Morton JR, et al. Decreasing mortality for aortic and mitral valve surgery in Northern New England. *The Annals of thoracic surgery* 2000; 70: 432-437.
  47. Halkos ME, Kilgo P, Lattouf OM, et al. The Effect of Diabetes Mellitus on In-Hospital and Long-Term Outcomes After Heart Valve Operations. *The Annals of Thoracic Surgery* 2010; 90: 124-130. DOI: <https://doi.org/10.1016/j.athoracsur.2010.03.111>.
  48. Movahed MR, Hashemzadeh M and Jamal MM. Increased prevalence of infectious endocarditis in patients with type II diabetes mellitus. *Journal of diabetes and its complications* 2007; 21: 403-406.
  49. Olmos C, Vilacosta I, Fernandez C, et al. Contemporary epidemiology and prognosis of septic shock in infective endocarditis. *European heart journal* 2013; 34: 1999-2006.
  50. Leither MD, Shroff GR, Ding S, et al. Long-term survival of dialysis patients with bacterial endocarditis undergoing valvular replacement surgery in the United States. *Circulation* 2013; 128: 344-351.

51. Duval X, Alla F, Doco-Lecompte T, et al. Diabetes mellitus and infective endocarditis: the insulin factor in patient morbidity and mortality. *European heart journal* 2007; 28: 59-64.
52. Chirillo F, Bacchion F, Pedrocchio A, et al. Infective endocarditis in patients with diabetes mellitus. *J Heart Valve Dis* 2010; 19: 312-320.
53. Yoshioka D, Toda K, Yokoyama J-y, et al. Diabetes mellitus adversely affects mortality and recurrence after valve surgery for infective endocarditis. *The Journal of Thoracic and Cardiovascular Surgery* 2018; 155: 1021-1029.e1025. DOI: <https://doi.org/10.1016/j.jtcvs.2017.09.013>.
54. Mazzone T, Chait A and Plutzky J. Cardiovascular disease risk in type 2 diabetes mellitus: insights from mechanistic studies. *The Lancet* 2008; 371: 1800-1809.
55. Katz R, Budoff MJ, Takasu J, et al. Relationship of metabolic syndrome with incident aortic valve calcium and aortic valve calcium progression: the Multi-Ethnic Study of Atherosclerosis (MESA). *Diabetes* 2009; 58: 813-819.
56. Mosch J, Gleissner CA, Body S, et al. Histopathological assessment of calcification and inflammation of calcific aortic valves from patients with and without diabetes mellitus. *Histology and histopathology* 2017; 32: 293.
57. Lindman BR, Pibarot P, Arnold SV, et al. Transcatheter Versus Surgical Aortic Valve Replacement in Patients With Diabetes and Severe Aortic Stenosis at High Risk for Surgery. *Journal of the American College of Cardiology* 2014; 63: 1090-1099. DOI: [doi:10.1016/j.jacc.2013.10.057](https://doi.org/10.1016/j.jacc.2013.10.057).
58. Abramowitz Y, Jilaihawi H, Chakravarty T, et al. Impact of Diabetes Mellitus on Outcomes After Transcatheter Aortic Valve Implantation. *The American Journal of Cardiology* 2016; 117: 1636-1642. DOI: <https://doi.org/10.1016/j.amjcard.2016.02.040>.
59. Conrotto F, D'Ascenzo F, Giordana F, et al. Impact of diabetes mellitus on early and midterm outcomes after transcatheter aortic valve implantation (from a multicenter registry). *The American journal of cardiology* 2014; 113: 529-534.
60. Capodanno D, Barbanti M, Tamburino C, et al. A Simple Risk Tool (the OBSERVANT Score) for Prediction of 30-Day Mortality After Transcatheter Aortic Valve Replacement. *The American Journal of Cardiology* 2014; 113: 1851-1858. DOI: <https://doi.org/10.1016/j.amjcard.2014.03.014>.
61. Tamburino C, Capodanno D, Ramondo A, et al. Incidence and predictors of early and late mortality after transcatheter aortic valve implantation in 663 patients with severe aortic stenosis. *Circulation* 2011; 123: 299-308.
62. Muñoz-García AJ, del Valle R, Trillo-Nouche R, et al. The Ibero-American transcatheter aortic valve implantation registry with the CoreValve prosthesis. Early and long-term results. *International journal of cardiology* 2013; 169: 359-365.
63. Ludman PF, Moat N, de Belder MA, et al. Transcatheter aortic valve implantation in the United Kingdom: temporal trends, predictors of outcome, and 6-year follow-up: a report from the UK Transcatheter Aortic Valve Implantation (TAVI) Registry, 2007 to 2012. *Circulation* 2015; 131: 1181-1190.
64. Ram E, Kogan A, Levin S, et al. Type 2 diabetes mellitus increases long-term mortality risk after isolated surgical aortic valve replacement. *Cardiovascular Diabetology* 2019; 18: 31. DOI: [10.1186/s12933-019-0836-y](https://doi.org/10.1186/s12933-019-0836-y).
65. Brown ML, Schaff HV, Lahr BD, et al. Aortic valve replacement in patients aged 50 to 70 years: improved outcome with mechanical versus biologic prostheses. *The Journal of thoracic and cardiovascular surgery* 2008; 135: 878-884.
66. Kirschfink A, Alachkar MN, Vogt F, et al. Outcome of transcatheter edge-to-edge mitral valve repair in patients with diabetes mellitus: results from a real-world cohort. *European Heart Journal* 2022; 43. DOI: [10.1093/eurheartj/ehac544.2114](https://doi.org/10.1093/eurheartj/ehac544.2114).
67. Ernande L, Beaudoin J, Piro V, et al. Adverse impact of diabetes mellitus on left ventricular remodelling in patients with chronic primary mitral regurgitation. *Archives of Cardiovascular Diseases* 2018; 111: 487-496. DOI: <https://doi.org/10.1016/j.acvd.2017.10.004>.
68. Shahim B, Ben-Yehuda O, Chen S, et al. Impact of Diabetes on Outcomes After Transcatheter Mitral Valve Repair in Heart Failure. *JACC: Heart Failure* 2021; 9: 559-567. DOI: [doi:10.1016/j.jchf.2021.03.011](https://doi.org/10.1016/j.jchf.2021.03.011).
69. Furnary AP, Wu Y and Bookin SO. Effect of Hyperglycemia and Continuous Intravenous Insulin Infusions on Outcomes of Cardiac Surgical Procedures: The Portland Diabetic Project. *Endocrine Practice* 2004; 10: 21-33. DOI: <https://doi.org/10.4158/EP.10.S2.21>.
70. Diehm C and Lawall H. Diabetes, Herzchirurgie und periphere Gefäße. *Clinical Research in Cardiology* 2006; 95: i63-i69. DOI: [10.1007/s00392-006-1123-y](https://doi.org/10.1007/s00392-006-1123-y).
71. Ruderman NB and Haudenschild C. Diabetes as an atherogenic factor. *Progress in cardiovascular diseases* 1984; 26: 373-412.
72. Akbari CM and LoGerfo FW. Diabetes and peripheral vascular disease. *J Vasc Surg* 1999; 30: 373-384. DOI: [10.1016/s0741-5214\(99\)70154-0](https://doi.org/10.1016/s0741-5214(99)70154-0).
73. Malone M, Lau NS, White J, et al. The Effect of Diabetes Mellitus on Costs and Length of Stay in Patients with Peripheral Arterial Disease Undergoing Vascular Surgery. *European Journal of Vascular and Endovascular Surgery* 2014; 48: 447-451. DOI: <https://doi.org/10.1016/j.ejvs.2014.07.001>.
74. Pyörälä K, Laakso M and Uusitupa M. Diabetes and atherosclerosis: an epidemiologic view. *Diabetes Metab Rev* 1987; 3: 463-524. DOI: [10.1002/dmr.5610030206](https://doi.org/10.1002/dmr.5610030206).
75. Donahue RP and Orchard TJ. Diabetes mellitus and macrovascular complications. An epidemiological perspective. *Diabetes Care* 1992; 15: 1141-1155. DOI: [10.2337/diacare.15.9.1141](https://doi.org/10.2337/diacare.15.9.1141).
76. Wallaert JB, Nolan BW, Adams J, et al. The impact of diabetes on postoperative outcomes following lower-extremity bypass surgery. *Journal of Vascular Surgery* 2012; 56: 1317-1323. DOI: <https://doi.org/10.1016/j.jvs.2012.04.011>.

77. Luther M and Lepäntalo M. Femorotibial reconstructions for chronic critical leg ischaemia: influence on outcome by diabetes, gender and age. *European journal of vascular and endovascular surgery* 1997; 13: 569-577.
78. Hertzner NR, Beven EG, Young JR, et al. Coronary artery disease in peripheral vascular patients. A classification of 1000 coronary angiograms and results of surgical management. *Annals of surgery* 1984; 199: 223.
79. Krupski WC, Layug EL, Reilly LM, et al. Comparison of cardiac morbidity between aortic and infrainguinal operations. *Journal of vascular surgery* 1992; 15: 354-365.
80. Akbari CM, Pomposelli FB, Gibbons GW, et al. Lower extremity revascularization in diabetes: late observations. *Archives of surgery* 2000; 135: 452-456.
81. Awad S, Karkos CD, Serrachino-Ingloft F, et al. The Impact of Diabetes on Current Revascularisation Practice and Clinical Outcome in Patients with Critical Lower Limb Ischaemia. *European Journal of Vascular and Endovascular Surgery* 2006; 32: 51-59. DOI: <https://doi.org/10.1016/j.ejvs.2005.12.019>.
82. Lazaris AM, Tsiamis AC, Fishwick G, et al. Clinical Outcome of Primary Infrainguinal Subintimal Angioplasty in Diabetic Patients with Critical Lower Limb Ischemia. *Journal of Endovascular Therapy* 2004; 11: 447-453. DOI: 10.1583/03-1159.1.
83. Hamdan AD, Saltzberg SS, Sheahan M, et al. Lack of association of diabetes with increased postoperative mortality and cardiac morbidity: results of 6565 major vascular operations. *Archives of surgery* 2002; 137: 417-421.
84. Axelrod DA, Upchurch Jr GR, DeMonner S, et al. Perioperative cardiovascular risk stratification of patients with diabetes who undergo elective major vascular surgery. *Journal of vascular surgery* 2002; 35: 894-901.
85. Stokes 3rd J, Kannel W, Wolf PA, et al. The relative importance of selected risk factors for various manifestations of cardiovascular disease among men and women from 35 to 64 years old: 30 years of follow-up in the Framingham Study. *Circulation* 1987; 75: V65-73.
86. Burchfiel CM, Curb JD, Rodriguez BL, et al. Glucose intolerance and 22-year stroke incidence. The Honolulu Heart Program. *Stroke* 1994; 25: 951-957.
87. Jørgensen H, Nakayama H, Raaschou HO, et al. Stroke in patients with diabetes. The Copenhagen Stroke study. *Stroke* 1994; 25: 1977-1984.
88. Mortel KF, Meyer JS, Sims PA, et al. Diabetes mellitus as a risk factor for stroke. *South Med J* 1990; 83: 904-911. DOI: 10.1097/00007611-199008000-00014.
89. Tuomilehto J, Rastenyte D, Jousilahti P, et al. Diabetes Mellitus as a Risk Factor for Death From Stroke. *Stroke* 1996; 27: 210-215. DOI: doi:10.1161/01.STR.27.2.210.
90. Skydell JL, Machleder HI, Baker JD, et al. Incidence and Mechanism of Post—Carotid Endarterectomy Hypertension. *Archives of Surgery* 1987; 122: 1153-1155.
91. Salenius J, Harju E and Riekkinen H. Early cerebral complications in carotid endarterectomy: risk factors. *J Cardiovasc Surg (Torino)* 1990; 31: 162-167.
92. Array AA, Array AA, Array AA, et al. *Результаты различных видов каротидной эндартерэктомии у пациентов с сахарным диабетом 2 типа.* 2021.
93. Plecha E, King T, Pitluk H, et al. Risk assessment in patients undergoing carotid endarterectomy. *Cardiovascular Surgery* 1993; 1: 30-32.
94. Akbari CM, Pomposelli Jr FB, Gibbons GW, et al. Diabetes mellitus: a risk factor for carotid endarterectomy? *Journal of vascular surgery* 1997; 25: 1070-1076.
95. Ahari A, Bergqvist D, Troëng T, et al. Diabetes mellitus as a risk factor for early outcome after carotid endarterectomy—a population-based study. *European journal of vascular and endovascular surgery* 1999; 18: 122-126.
96. Debing E, Aerden D and Van den Brande P. Diabetes mellitus is a predictor for early adverse outcome after carotid endarterectomy. *Vascular and endovascular surgery* 2011; 45: 28-32.
97. Dorigo W, Pulli R, Pratesi G, et al. Early and long-term results of carotid endarterectomy in diabetic patients. *Journal of vascular surgery* 2011; 53: 44-52.
98. Hussain MA, Bin-Ayeed SA, Saeed OQ, et al. Impact of diabetes on carotid artery revascularization. *Journal of Vascular Surgery* 2016; 63: 1099-1107. e1094.